REMARKS/ARGUMENTS

Claims 10 and 14 have been canceled. New Claims 16-18 have been added. The limitations of canceled Claim 14 has been added to Claim 1, and the oxide film of currently amended Claim 1 is now defined in the manner described in the Specification at page 5, first full paragraph, so that it "comprises 50 mass% or more of a crystalline oxide." New Claim 16 is supported at page 6, paragraphs 2 and 3, of the Specification. New Claims 17 and 18 is supported at pages 11-12, bridging para., of the Specification. No new matter has been added.

1. Rejection of Claims 1, 2, and 7-14 under 35 U.S.C. §112, 1st para.

The Examiner rejected Claims 1, 2, and 7-14 under 35 U.S.C. §112, 1st para., for noncompliance with its written description requirement. Claims 10 and 14 have been canceled.

The Examiner objects to the language in Claim 1 which includes "the oxide comprises aluminum" (Office Action (OA), p. 3). According to the Examiner, there is no written descriptive support for "the oxide film comprises Al and 50 mass% or more of a crystalline oxide" in the Specification. The criticized phrase has been deleted and replaced by "the oxide film comprises 50 mass% or more of a crystalline oxide" which is supported at page 5, lines 6-7, of the Specification. Accordingly, the rejection of Claims 1, 2, 7-9, and 11-13 under 35 U.S.C. §112, 1st para., should be withdrawn.

2. Rejection of Claims 1, 2, and 7-14 under 35 U.S.C. §103

Claims 10 and 14 are canceled. New Claims 16-18 have been added.

Claims 1, 2, 7-9, and 11-13 stand finally rejected under 35 U.S.C. §103 over EP'139 (EP 1 126 139 A2, published August 22, 2001) in view of Grunke (U.S. Patent 4,936,927,

issued June 26, 1990), Lampman (Lampman, S., "Wrought Titanium and Titanium Alloys," ASM Handbook, Vol. 2, ASM International, pp. 597-600, 1990), Yao (U.S. Patent 6,066,359, issued May 23, 2000), and JP'522 (JP 6-322522), published November 22, 1994. The Examiner should withdraw the rejections over applied prior art[1] and pass Claims 1, 2, 7-9, 11-13, and 16-18 to issue.

Preliminarily, Applicant submits that the Examiner's rejection of Claims 1, 2, 7-9, and 11-13 under 35 U.S.C. §103 over the five applied references in light of the Examiner's explanation thereof is itself evidence that the subject matter Applicant claims is patentable. The Examiner appears to have fallen victim to an impermissible use of hindsight in attempting to reconstruct Applicant's claims.

Applicant is well aware that the obviousness of a claimed invention may be established over any number of prior art references. *In re Gorman*, 933 F.2d 982, 986 (Fed. Cir. 1991) (the criterion for obviousness is not the number of references applied but what they would have meant to persons having ordinary skill in the art). However, there is a basic difference between the manner in which the prior art was applied in *Gorman* and the way it is applied in this case. In *Gorman*, the PTO applied numerous references, but each reference disclosed a different feature of the claimed article of manufacture. Here, the Examiner has at times applied up to five references to establish the obviousness of a single element of the multilayered titanium alloy material claimed. Unlike the case in *Gorman*, the Examiner here has made a case for the unpatentability of Applicant's claimed titanium alloy material by

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[1] The Examiner has not reasserted the rejections of Claims 1, 2, and 7-14 under 35 U.S.C. §103 in view of various combinations of EP'139, Yen (Corrosion Science, pp. 2031-2051, 1999), JP'996 (JP-61-276996A), Dearnaley (U.S. Patent 4,465,524), and Yao. Because the rejections have not been reasserted and the Examiner has stated that "Applicant's arguments with respect to the Dearnaley (U.S. Patent 4,465,524) reference have been considered but are moot in view of the new grounds of rejection[,]" Applicant presumes that the earlier rejections in view of other applied prior art are not maintained and/or have been withdrawn by the Examiner in favor of the new grounds of rejection entered September 17, 2008.

multiple progressions of the teachings of different references to form each layer of the multilayer composite material claimed. See, for example, the Examiner's ultimate argument in support of the rejection of Applicant's Claims 1, 11, and 13 at page 6 (OA, second full para.):

> . . . Miyamoto . . . in view of Grunke . . . and Lampman, and . . . Yao . . . do not teach that the oxide contains aluminum. However, [JP'522] . . . teaches that alumina . . . protects titanium and its alloys in corrosive environments (abstract). Therefore, it would have been obvious . . . to ensure that the oxide on the titanium alloy of Miyamoto . . . in view of Grunke . . . Lampman, and Yao . . . contain[s] aluminum, as taught by [JP'522] . . . because the presence of alumina would further enhance the alloy.

In order to reach and consider the teaching of JP'522 and reject Applicant's Claim 1, however, the Examiner had to first consider EP'139 for its teaching of a Ti-Al alloy with 0.5-2.3 mass% aluminum and inevitable impurities (OA, p. 5, first para.); combine Grunke's teaching to protect the surface of titanium alloys by increasing the concentration of Al near the surface (OA, p. 5, second para.); combine Lampman's teaching that the concentration of aluminum in the concentrated Al layer of Grunke is a result effective variable for the tensile strength, creep strength, and elastic moduli of Ti alloys and optimize the content and thickness of one or more layers accordingly (OA, pp. 5-6, bridging para.); and combine Yao's teaching to form a titanium oxide layer of specified thickness over Grunke's protective high concentration Al layer on the surface of EP'139's superior Ti-Al alloy and then optimize all concentrations of elements and thicknesses of the layers for reasons disclosed by Lampman. Only then does the Examiner propose that it further would have been obvious to a person having ordinary skill in the art to disregard all of Yao's specific teachings to protect surfaces with a titanium oxide layer of a specified thickness and replace that titanium oxide layer of specified thickness with an Al_2O_3 layer taught by JP'522 at the thickness taught by Yao for its titanium layer in order to protect a Ti-Al alloy taught by EP'139. Of course, persons having ordinary skill in the art must have first improved the Ti-Al alloy taught by

EP'139 by forming the high concentration Al layer of Grunke thereon and optimizing the concentration and thickness thereof for the optimum tensile strength, creep strength, and elastic moduli recommended by Lampman for titanium alloys generally. Surely the Examiner will recognize that the subject matter Applicant claims has been reconstructed based on impermissible hindsight.

Segregating the individual teachings of the applied references, Applicant understands that the high concentration of Al Grunke forms on the surface of a titanium alloy comprises an outermost layer of $TiAl_3$, a first adjacent inner layer of $TiAl_2$, a further inner layer of TiAl, and an innermost layer of Ti_3Al (Grunke, col. 3, ll. 30-61; col. 6, ll. 16-26; and Fig. 2a). Accordingly, persons having ordinary skill in the art reasonably would have expected that the high concentration Al layer formed on the surface of a titanium alloy by Grunke has a high concentration of Al in excess of the maximum amount allowed by the claimed range of from 0.8-25 mass% required for Applicant's claimed titanium alloy material.

Then, Yao does not appear to apply its thin protective film of titanium oxide to the surface of any titanium alloy. Moreover, Yao does not apply a thin protective film of titanium oxide to any surface to improve its hydrogen absorption resistance. Rather, Yao teaches that thin titanium oxide films are normally applied to ceramics such as glass or tiles or inorganic fibers (Yao, col. 1, ll. 27-38). Yao applies a thin titanium oxide film to such a substrate because its photocatalytic properties are critical for catalyzing the decomposition of a variety of nasty organic materials, i.e., for sterilization, etc. (Yao, col. 1, ll. 13-27). Yao would not have taught or reasonably suggested that thin films of titanium oxide may or should be applied to a Ti-Al alloy surfaces to improve its hydrogen absorption resistance. Yao's teaching does not appear to be analogous to either the invention defined by Applicant's problem or any subject matter described by EP'139, Grunke, Lampman, and JP'522. It is unreasonable to assume that a person having ordinary skill in the art would have optimized

the teachings of EP'139, Grunke, Lampman, and JP'522 for any reason associated with Yao's disclosure.

Since Yao's thin titanium oxide film is applied to a surface for its catalytic activity in decomposing organic compounds, persons having ordinary skill in the art would never have thought to replace Yao's thin titanium oxide film with a thin film of Al_2O_3 to impart any other kind of corrosion resistance to a titanium alloy. Most certainly, persons having ordinary skill in the art would not have replaced Yao's thin titanium oxide film with a thin film of Al_2O_3 to improve the hydrogen absorption resistance of a Ti alloy substrate.

JP'522 describes the formation of an acid-resistant film of Al_2O_3 over the surface of titanium oxide formed on the surface of a Ti-base alloy (JP'522, Abstract). On the other hand, Yao describes the formation of a thin catalytic film of titanium oxide on the surface of a ceramic substrate. Neither the film of Al_2O_3 formed over the surface of a titanium oxide formed on the surface of a Ti-base alloy by JP'522 nor the thin titanium oxide film formed on the surface of a ceramic substrate by Yao is a mixed oxide "film . . . produced by a process comprising oxidating the Ti-Al alloy" as Applicant's Claim 1 requires. Applicant's oxide film is a mixed oxide film produced by oxidating the Ti-Al alloy. Neither JP'522 nor Yao describe such a mixed oxide film. Here, the process of producing the oxide film defines the oxide film. It is the oxidation product of a Ti-Al alloy.

Recognizing the deficiencies in the teachings of Yao and JP'522, the Examiner argues that, "in order to grow oxide on Ti-Al alloy," the base Ti-Al alloy "would necessarily be oxidized in the process" (OA, p. 7, fourth para.) Yao and/or JP'522 describe. The argument is not consistent with either prior art disclosure. Yao requires a titanium oxide layer on its surface for catalytic activity. Yao's titanium oxide layer is applied "on the surface of a substrate <u>in an aqueous solution</u> containing at least one titanium fluoro complex compound" (Yao, Claims 1, 19, 37, and 54; emphasis added). Yao's substrate is not a Ti-Al alloy, but

even if it were be a Ti-Al alloy, the surface of that substrate is not likely to be oxidized when the surface is placed in an aqueous solution containing at least one titanium fluoro complex compound as Yao's process requires. On the other hand, JP'522 teaches that a thin film of Al_2O_3 is formed over an undercoat of titanium oxide formed on the surface of a Ti-base alloy. The base alloy is not exposed when the thin film of Al_2O_3 is formed and the thin film of Al_2O_3 is formed on the surface is not a mixed oxide. The Examiner's "the base alloy itself would necessarily be oxidized in the process" argument is at best contrary to the prior art teachings at best and otherwise incongruous.

The Ti-Al alloy described in EP'139 is said to be superior in the forming-workability, heat-resistance, and oxidation-resistance required for mufflers [0022]. Persons having ordinary skill in the art would not have looked to improve the hydrogen absorption resistance of Ti-Al alloys for mufflers or to optimize other result-effective variables to necessarily improve the hydrogen absorption resistance of Ti-Al alloys for mufflers. EP'139 is not concerned with the hydrogen absorption resistance of its Ti-Al alloys. Persons having ordinary skill in the art normally seek "to improve upon what is already generally known." *In re Peterson*, 315 F.3d 1325, 1330 (Fed. Cir. 2003). Nor would persons having ordinary skill in the art reasonably have acted to improve the heat-resistance and/or oxidation-resistance of the Ti-Al alloys described by EP'139. According to EP'139, they already make superior mufflers.

Neither Grunke, JP'522, Yao nor Lampman is concerned with the hydrogen absorption resistance of Ti-Al alloys. The Examiner has not explained why persons having ordinary skill in the art would have sought to otherwise improve the corrosion resistance of the Ti-Al alloys EP'139 identifies as having superior corrosion resistance. The Examiner has not established that optimization of variables which Grunke deems effective to improve the heat-resistance and oxidation-resistance of Ti alloys or which JP'522 deems effective to

improve resistance to nitric acid, hydrochloric acid, sulfuric acid, or halogen gases, would necessarily result in the titanium alloy material Applicant currently claims. Accordingly, why would a person having ordinary skill in the art have been led by the prior art to optimize the amount of Al in Grunke's concentrated Al layer and apply that teaching to the Ti-Al alloys described by EP'139 when the alloys described by EP'139 have superior heat-resistance and oxidation-resistance? Moreover, Grunke appears to recommend concentrations of Al in its concentrated Al layer which are far in excess of the amounts Applicant suggests for hydrogen absorption resistance.

The Federal Circuit instructed in *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 934 (Fed. Cir. 1990):

> It is insufficient that the prior art disclosed the components of the . . . [claimed subject matter], either separately or used in other combinations; there must be some teaching, suggestion, or incentive to make the combination made by the inventor.

The Examiner has not explained what incentive persons having ordinary skill in the art would have had to apply a high concentration Al layer protective against oxygen embrittlement (Grunke, col. 3, ll, 1-6) over the superior heat-resistant and/or oxidation-resistant Ti-Al alloys described by EP'139. Nor has the Examiner explained what incentive persons having ordinary skill in the art would have had to further apply yet another corrosion resistant oxide layer thereover. The Examiner's assertions of obviousness appear to have emanated from Applicant's disclosure. The subject matter Applicant claims would not have been obvious over the applied prior art teachings.

The Examiner's argument that the limitation of Claim 8 requiring "[t]he titanium alloy material of Claim 1 [to be] in contact with a steel member" is no more than an "intended use" (OA, p. 7, second full para.) or functional language which does not further limit the claimed subject matter is contrary to the express language of the claim. Claim 8 is

directed to the titanium alloy material of Claim 1 in contact with a steel member. The prior art does not suggest that claimed combination.

Ultimately, the Examiner relies on the more general teachings of Lampman that persons having ordinary skill in the art would have optimized the combined teachings of EP'139, Grunke, Yao, and JP'522 with regard to other result effective variables to achieve "a desired tensile strength, creep strength, and elastic moduli" (OA, pp. 5-6, bridging para.). However, Applicant's claimed titanium alloy material is designed for hydrogen absorption resistance. The tensile strength, creep strength, and elastic moduli are of no apparent concern. It is not impossible that a person having ordinary skill in the art set when optimizing titanium alloys with respect to tensile strength, creep strength, and elastic moduli might serendipitously stumble on Applicant's claimed Ti-Al alloy material, but optimization of the prior art teachings to that end would not have necessarily led to the invention Applicant claims. The Examiner merely speculates.

Here, the Examiner has breached the criteria for concluding that claimed subject matter is unpatentable under 35 U.S.C. §103. To conclude that the subject matter Applicant claims is unpatentable for obviousness under 35 U.S.C. §103, the prior art must reasonably suggest the claimed subject matter to a person having ordinary skill in the art with reasonable expectation of successfully making and using the same. *In re O'Farrell*, 853 F.2d 894, 903 (Fed. Cir. 1988). Here, the Examiner's rejection of the patentability of the subject matter claimed appears to be based on hindsight and should be withdrawn.

For the reasons stated herein, Applicant's respectfully ask the Examiner to reconsider the applied rejections under 35 U.S.C. §103, acknowledge the patentability of Applicant's Claims 1, 2, 7-9, 11-13, and 16-18, and pass this case to issue.

Respectfully submitted,

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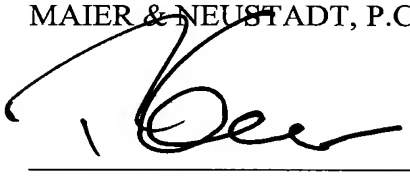

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